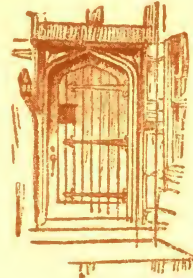
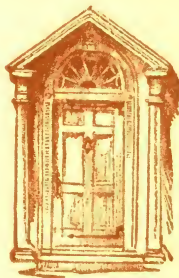
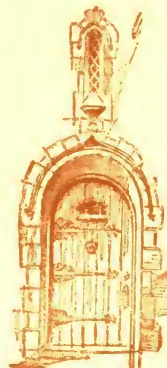


MANUAL OF VENEERED DOORS

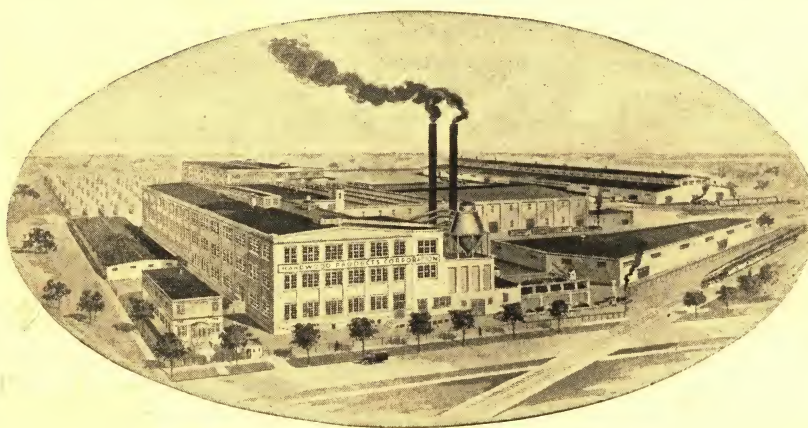


**HARDWOOD
PRODUCTS
CORPORATION**

*NEENAH
WISCONSIN*



*Quality Is Never an Accident But Always
the Result of High Intention, Sincere Effort,
Intelligent Direction and Skillful Execution*



HARDWOOD PRODUCTS CORPORATION PLANT

QUALITY

QUALITY VENEERED DOOR installations are never accidents.

MECHANICAL EQUIPMENT or large volume production does not in itself produce quality. QUALITY must emanate from a determined desire on the part of the organization and every one connected with it to give the highest grade of workmanship and materials for the price quoted.

The QUALITY of HARDWOOD PRODUCTS CORPORATION VENEERED DOORS is based on the cumulative experience of a corps of master craftsmen whose long, uninterrupted association with the Company and its policies have made them quality-conscious.

HARDWOOD PRODUCTS CORPORATION doors are not orphans. Each door is stamped with our name on the top rail, assuring a guaranteed door.

It may be said that there is very little difference between doors as made by one manufacturer and another, under the same specifications, but this little difference may be an important consideration.

THE PURPOSE OF THIS MANUAL

It is the purpose of this MANUAL to co-ordinate all important factors of veneered door design and construction in a proper relationship, for the benefit of the ARCHITECT, DEALER, and BUILDER.

Our recommendations, as incorporated in this MANUAL, are based on the experience of many years as manufacturers of veneered doors exclusively, our production over the last twelve years alone being over 3,000,000 doors of varied woods and details of construction.

GUARANTY

WE UNQUALIFIEDLY GUARANTEE EVERY HARDWOOD PRODUCTS CORPORATION DOOR MADE ACCORDING TO OUR RECOMMENDATIONS AND AS DESCRIBED IN THIS MANUAL TO BE FREE FROM DEFECTS OF WORKMANSHIP AND MATERIAL, AND WILL REPLACE ANY DOORS THAT PROVE TO BE DEFECTIVE WITHIN THE MEANING OF OUR SPECIFICATIONS AND RECOMMENDATIONS.

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SPECIFY HARDWOOD PRODUCTS CORPORATION DOORS

HARDWOOD PRODUCTS CORPORATION

MAIN OFFICE AND FACTORY
NEENAH, WISCONSIN

SALES OFFICES

NEW YORK, N. Y.
1021—101 Park Avenue
Telephone: Ashland 7594

CHICAGO, ILL.
1310—333 No. Michigan Ave.
Telephone: State 6088

CLEVELAND, OHIO
416 Midland Bank Bldg.
Telephone: Main 1465

SAN FRANCISCO, CAL.
3045 19th St.
Telephone: Valencia 2241

THE COMPANY—ITS FACILITIES AND PRODUCTS

The Company

Located in the heart of the hardwood country, the company has been continuously in business for twenty (20) years, specializing in the manufacture of high quality hardwood-veneered and solid-softwood doors.

Responsibility

Our rating in R. G. Dun's and Bradstreet's is over \$1,000,000—first grade of credit.

Facilities

We operate one of the largest plants in the country devoted to the manufacture of hardwood-veneered and solid-softwood doors.

Our plant is equipped with the most modern and efficient door machinery.

During the last twelve (12) years we have manufactured over 3,000,000 doors for buildings in all sections of the United States and Canada.

Standard (Stock) Doors

We manufacture a complete line of Standard Hardwood-veneered and Solid-softwood Doors in a variety of standard designs.

Standard Thicknesses—1 $\frac{3}{4}$ and 1 $\frac{1}{2}$ in.

Standard Widths—2 ft., 2 ft. 2 in., 2 ft. 4 in., 2 ft. 6 in., 2 ft. 8 in., 2 ft. 10 in. and 3 ft.

Standard Heights—6 ft. 8 in., 6 ft. 10 in. and 7 ft.

Standard Stile Widths—4 $\frac{7}{8}$ and 5 $\frac{1}{2}$ in.

Standard Rail Widths—4 $\frac{7}{8}$, 5 $\frac{1}{2}$, 8 $\frac{1}{4}$, 9 $\frac{1}{2}$ and 12 in.

Note: Standard stile and rail widths work to economical milled stock lumber and veneer sizes. Widths are full stile and rail widths and in the case of solid stuck mouldings include the moulding.

Flush Doors

The constantly increasing demand for Hardwood Products Corporation flush doors is evidence in itself of the high quality of their construction. As a result of our drying and seasoning methods, using specially designed equipment, we have eliminated the common defects in the ordinary flush door, such as checks, ridges and waves in the face veneer.

The construction is five-ply laminated. All face veneer and cross-banding is thoroughly re-dried in veneer plate dryers before the material enters the manufacturing plant.

Flush doors are far more durable than other doors.

We can furnish this type of door as well as any other type in a fireproof construction to meet the building code of the City of New York. This fireproof feature is described on page 14.

Standard Thickness—1 $\frac{3}{4}$ in.

Standard Widths—2 ft., 2 ft. 2 in., 2 ft. 4 in., 2 ft. 6 in., 2 ft. 8 in., 2 ft. 10 in., 3 ft., 3 ft. 4 in., 3 ft. 8 in. and 4 ft.

Standard Heights—6 ft. 8 in., 6 ft. 10 in., and 7 ft.

Semi-special Doors

These doors have all the characteristics of special doors with the advantages of certain standardization economies. By using our standard door thicknesses (1 $\frac{3}{4}$ and 1 $\frac{1}{2}$ in.) and our standard widths of stile (4 $\frac{7}{8}$ and 5 $\frac{1}{2}$ in.) and rails (4 $\frac{7}{8}$, 5 $\frac{1}{2}$, 8 $\frac{1}{4}$, 9 $\frac{1}{2}$ and 12 in.) a considerable saving in cost can be made with no apparent loss in individual design. Special assembly of stiles and rails to suit the designer's taste may be made. Mouldings may be of special design profiles.

Special Doors

Due to specialization and our unusual mill facilities, we are able to produce—at surprisingly reasonable cost—special design doors of the highest standard of material and workmanship, in accordance with architect's details.

Fire-resisting Wood Doors

We have a complete plant for fully fireproofing wood and are manufacturing doors made of this fireproofed wood which will meet the rigid requirements of the building code of the City of New York. This code requires that doors in all buildings over 150 ft. high shall be either of steel or of fireproofed wood which will meet the prescribed tests.

X-Ray or Lead-lined Flush Doors

As a standard construction for our lead-lined Flush Doors we have adopted specifications similar to those prescribed by the New York State Building Code, which we believe to be superior to any other type of construction. See description and details, pages 11 and 13.

Standard Thickness—2 $\frac{1}{8}$ in.

Standard Widths—2 ft., 2 ft. 2 in., 2 ft. 4 in., 2 ft. 6 in., 2 ft. 8 in., 2 ft. 10 in., 3 ft., 3 ft. 4 in., 3 ft. 8 in. and 4 ft.

Standard Heights—6 ft. 8 in., 6 ft. 10 in., 7 ft.

Sound-proof Flush Doors

These highly sound-resistant flush veneered doors of very practical construction are made of two $\frac{7}{8}$ in. thick doors glued to a $\frac{3}{8}$ in. thick center of Flax-li-num insulation. The Flax-li-num center has a wood edge 2 $\frac{1}{2}$ in. wide by $\frac{3}{8}$ in. thick forming a solid wood edge around the perimeter of the door. Sound Proof Flush Doors are particularly adapted to use in hospitals and for communicating doors in hotels.

Standard Thickness—2 $\frac{1}{8}$ in.

Standard Widths—2 ft., 2 ft. 2 in., 2 ft. 4 in., 2 ft. 6 in., 2 ft. 8 in., 2 ft. 10 in., 3 ft., 3 ft. 4 in., 3 ft. 8 in. and 4 ft.

Standard Heights—6 ft. 8 in., 6 ft. 10 in., 7 ft.

Laminated (Three Ply) Flooring

The HARDWOOD PRODUCTS CORPORATION, beside doors, manufacture an exceptionally high grade laminated (3 ply) flooring of random widths and lengths showing artificial crack lines, plugs and keys, both plain and period patterns, in plain White Oak and Quartered White Oak plain or fumed, plain Red Oak, Walnut, Teak and other accepted flooring woods.

STANDARD PANELED AND GLAZED DOORS

Construction Standards and Special Features—Specification Data

Kiln Drying and Seasoning of Material

Note: As a result of our special drying and seasoning methods we have practically eliminated the common defects in the ordinary stock door such as checks, ridges and waves in the panel face veneers and core joints showing through the stile and rail face veneers. Our specially designed drying and seasoning equipment insures permanently smooth veneered surfaces in the finished doors.

Cores—All core blocks are kiln-dried to from 3 to 4 per cent moisture in a specially designed core kiln.

Panels—All face veneer, center stock and cross-banding is thoroughly re-dried in veneer plate-driers and all moisture removed before the material enters the manufacturing plant. After gluing up, the finished panels are re-dried before sanding to remove the excess moisture contained in the glue.

Stiles and Rails—Before stiles and rails are machined and clamped into the finished door, they are thoroughly seasoned and moisture from the glue removed so that the finished door will contain, as nearly as possible, the same percentage of moisture (on the average about 6 per cent) as will obtain at the point of delivery and installation.

Glue

We strongly recommend the use of a selected, high grade vegetable glue for interior doors. However, where specified we can furnish our doors with the face veneers applied with waterproof glue. Laboratory tests have shown that this waterproof glue, although not affected by moisture, does not make quite as strong a glue joint as a high-grade vegetable glue.

Core Material and Construction

All core material used in building up stiles and rails is composed of clear white pine blocks. The core blocks are put together with special tongue and groove joints (see details) assuring maximum glue surface for strength and perfect, permanent alignment. Both edges of the stile and rail pine cores are finished with $\frac{7}{8}$ in. interlocking hardwood strips.

Note: Wherever necessary, we are prepared to furnish doors according to New York State Specifications which provide for alternating full length core strips and, in some cases, heavier veneers than usual. See detail, page 14.

Face Veneers

Rotary-cut Veneers—Unless otherwise specified, standard (stock) Oak, Birch and Gum doors are veneered with rotary-cut veneers, carefully selected to guard against the rupture of the wood fiber. They cost somewhat less than sliced or sawed veneers.

Note: Our experience proves that properly manufactured rotary-cut veneer gives a satisfactory surface.

Sliced or Sawed Veneers—Where so specified we are prepared to furnish (at somewhat higher cost) sliced or sawed veneers. All quarter figured gum,

quartered oak, walnut and mahogany veneers are either sliced or sawed.

Plain Oak—Furnished in both Red and White Oak. Stile and rail veneers should be not less than $\frac{1}{8}$ in. thick before sanding and panel veneers not less than $\frac{1}{16}$ in. thick before sanding.

Note: Specify whether Red or White (Red usually costs less than White); thickness for stiles and rails and for panels; rotary-cut, or sliced or sawed.

Quartered White Oak—Furnished in large or small flake figure and in special figure, sliced or sawed veneers only. Stile and rail veneers should be not less than $\frac{1}{16}$ in. before sanding and panel veneers not less than $\frac{1}{32}$ in. before sanding.

Note: Specify whether large or small flake or special figure. If special figure is desired, specify that manufacturer shall submit samples for approval. Specify thickness for stiles and rails and for panels.

Birch and Gum—Furnished in Unselected, Selected Red and Selected White. The regular grades are what is commercially known as unselected, meaning unselected as to color, otherwise clear sound wood of first quality. In both Birch and Gum the outer part of the log is known as "White" and on the large logs the inside is "Red." Unselected veneers are successfully used where a medium or dark stain is applied. Either Selected Red or White Birch or Gum costs considerably more than Unselected. Stile and rail veneers should be not less than $\frac{1}{8}$ in. thick before sanding and panel veneers not less than $\frac{1}{16}$ in. thick before sanding.

Note: If Selected Red or White are desired, so specify, otherwise it will be understood that Unselected will be furnished. Specify thickness for stiles and rails and for panels; rotary-cut or sliced or sawed.

Quartered Figured Gum—Produced only from the heart of Figured Red Gum logs, considered a cabinet wood, and furnished in sliced or sawed veneers only. Stile and rail veneers should be not less than $\frac{1}{16}$ in. thick before sanding and panel veneers not less than $\frac{1}{32}$ in. thick before sanding. Panels should be made five (5) ply.

Note: Specify thickness for stiles and rails and for panels. If special figure is desired, specify that manufacturer shall submit samples for approval or specify the price per sq. ft. See "Selection of Hardwood Door Veneers," page 15.

Walnut—Furnished in half-round rotary-cut or sliced or sawed. Half-round rotary-cut is the cheapest, and the figure and texture of the veneer is not as good. Stile and rail veneers should not be less than $\frac{1}{16}$ in. thick before sanding and panel veneers not less than $\frac{1}{32}$ in. before sanding.

Note: Specify thickness for stiles and rails and for panels; half-round rotary-cut or sliced or sawed. If special figure is desired, specify that manufacturer shall submit samples for approval or specify the price per sq. ft. See "Selection of Hardwood Door Veneers," page 16.

CONDENSED SPECIFICATIONS

Paneled and Glazed Doors

For full specifications see Page 18

STANDARD DESIGN DOORS

Describe design. This will embrace standard construction and layout.

SPECIAL DESIGN DOORS

Cores

White Pine with strips not over $1\frac{3}{4}$ in. wide, tongued and grooved and dried to from 3 to 4% moisture.

Veneers

Specify thickness on stiles, rails and panels before sanding. Unless mentioned, standard thickness will be furnished.

Sanding

Specify kind of sanding wanted. "Well sanded" is interpreted as machine sanding. Better class jobs should be specified "belt sanded," which is almost equivalent to hand cleaning.

Miscellaneous

Specify thickness of panel; specify whether solid stuck or nailed-in mould. Unless otherwise mentioned, dowel construction is assumed.

Unless mentioned, or detailed sections are made, all dimensions will be assumed to be within standard.

Be specific on kind of wood. For example, if Red Birch (Heart) is wanted, be sure to add "(Heart)."

GUARANTY

We Unqualifiedly Guarantee every HARDWOOD PRODUCTS CORPORATION door, made according to our recommendations and as described in this Manual, to be free from defects of workmanship and materials, and will replace any doors that prove to be defective within the meaning of our specifications and recommendations.

Mahogany—Furnished in sliced or sawed veneers only. Stile and rail veneers should not be less than $\frac{1}{10}$ in. thick before sanding and panel veneers not less than $\frac{1}{32}$ in. before sanding.

Note: Specify thickness for stiles and rails and for panels. If special figure is desired, specify that manufacturer shall submit samples for approval or specify the price per sq. ft. See "Selection of Hardwood Door Veneers," page 16.

Dowel Construction

Unless otherwise specified, all cross rails are doweled to stiles with our special doweled construction. Dowels are of clear birch or oak not less than $\frac{1}{2}$ in. in diameter ($\frac{3}{8}$ in. for $2\frac{1}{4}$ in. doors and thicker) with four (4) grooves cut the length of the dowel to permit glue to pass freely up and around the entire length of the dowel. Dowels are 5 in. long accurately set $2\frac{1}{4}$ in. apart O. C. and one-half their length in the stile and one-half in the rail. Dowel holes are accurately bored to provide a perfectly tight fit.

Note: See "Doweled versus Mortised and Tenoned Construction," page 15.

Panel Thicknesses

Our standard panels are $\frac{1}{2}$ in. thick, three (3) ply. Where a thicker panel is desired we recommend $\frac{3}{4}$ in. thick, five (5) ply.

Sanding and Finishing

Unless otherwise specified, we furnish machine sanding on all paneled and glazed doors of stile and rail construction.

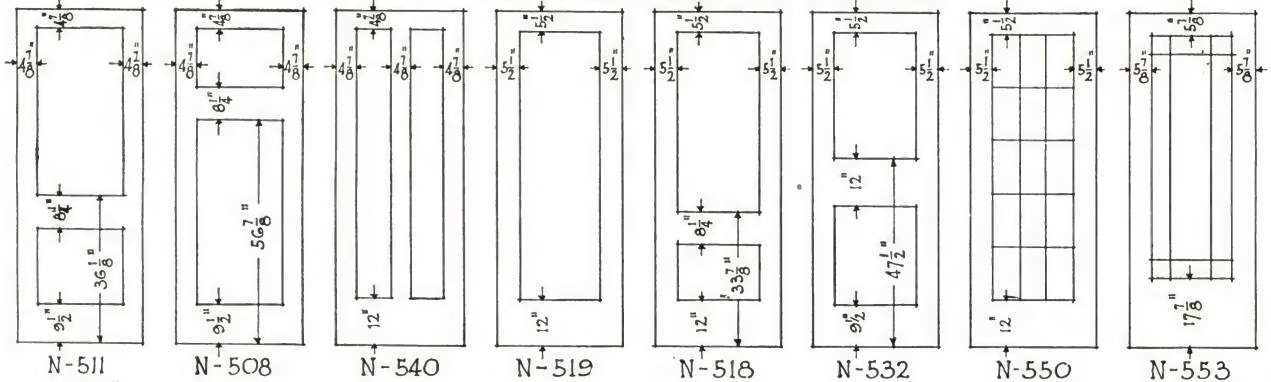
We take particular pride in the quality of our machine sanding and can assure a perfectly smooth surface which requires practically no retouching by the painter. Cross-sander marks on the cross rails cannot be avoided.

Where a higher grade of sanding is required, ready for painter's finish, we recommend belt sanding or hand sanding, for which an additional charge is made.

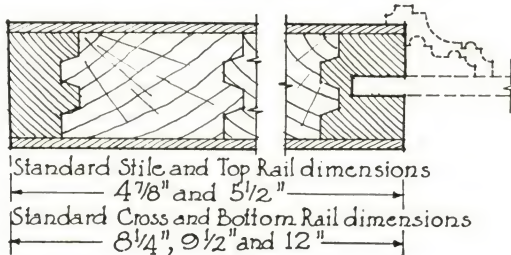
Regardless of specifications, we belt sand the panels on all cabinet woods, such as Walnut, Mahogany, Quartered Oak, etc.

STANDARD DETAILS—HARDWOOD PRODUCTS CORPORATION'S DOORS

STANDARD DOORS SERIES N-500

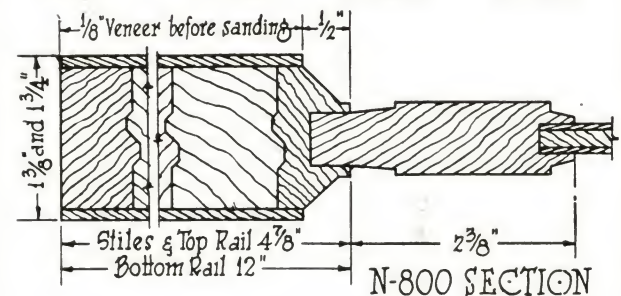
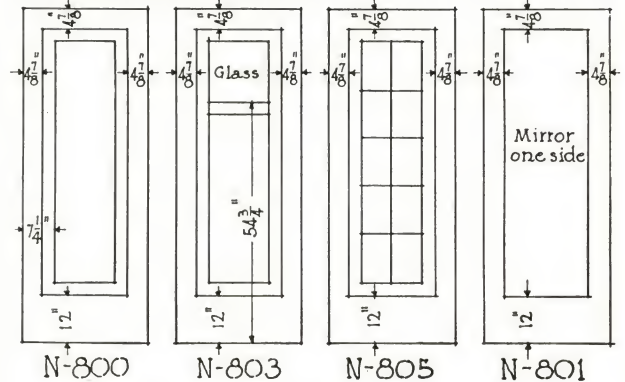


SEMI-SPECIAL DOORS



Standard panel designs as above or Special designs as desired with Special panel moldings. Panel Splines may be added if desired at slight added cost. These doors are economical.

STANDARD DOORS SERIES N-800



Designs above are a few of the most popular of series N-800

STANDARD (STOCK) PANELED AND GLAZED DOORS

Note Stile and Rail Dimensions



N-501
47/8"-9 1/2"



N-503
47/8"-9 1/2"



N-504
47/8"-9 1/2"



N-508
47/8"-8 1/4"-9 1/2"
(N-509 same with
1 lt. above)



N-511
47/8"-8 1/4"-9 1/2"



N-512
47/8"-8 1/4"-9 1/2"



N-513
5 1/2"-8 1/4"-12"



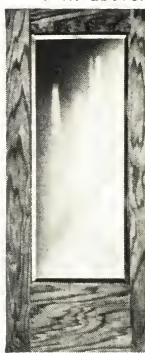
N-514
47/8"-9 1/2"



N-518
5 1/2"-8 1/4"-12"



N-519
5 1/2"-12"



N-521
6 1/2"-18 1/2"



N-540
47/8"-12"



N-541
47/8"-12"



N-542
47/8"-12"
(N-543 same
with 3 vert.
pan.)



N-545
47/8"-9 1/2"



N-546
47/8"-8 1/4"-9 1/2"



N-548
47/8"-9 1/2"
(N-549 same 5 1/2"-
12" stiles and rails)



N-550
5 1/2"-12"



N-551
47/8"-9 1/2"



N-553
57/8"-17 7/8"



N-554
5 1/2"-12"



N-574
5 1/2"-12"
(N-571 same
with 8 lts. above)



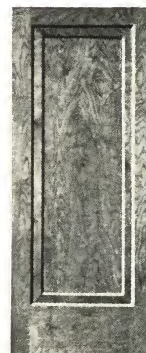
N-575
5 1/2"-12"
(N-572 same with
8 lts. above)



N-576
5 1/2"-12"
(N-570 same with
8 lts. above)
(N-573 same with
1 lt. above)



N-577
5 1/2"-12"
(N-578 same with
3 pan. below)



N-800
47/8"-12"
(Inner Frame)



N-803
47/8"-12"
(Inner Frame)



N-805
47/8"-12"
(Inner Frame)

SPECIAL AND SEMI-SPECIAL PANELED AND GLAZED DOORS

For Descriptions of Semi-Special and Special Doors, See Pages 1 and 3



N-519
Grille



N-544



N-550
Mirror Backs



Louver



Louver
(Sliding Panel)
(See detail, page 8)



10 Pan. Special Head



15 Pan. Special



6 Pan. Special



10 Pan. Special



N-615



N-620



N-622



N-624



N-626



N-628



N-814



Special "A"



Special "B"



Special "C"



Special "D"



Special "E"



Special "F"

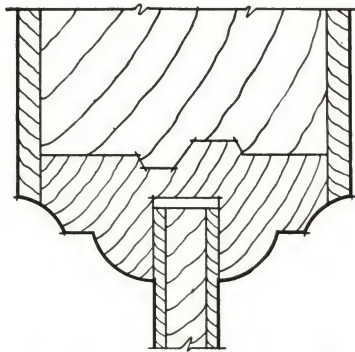


Special "G"

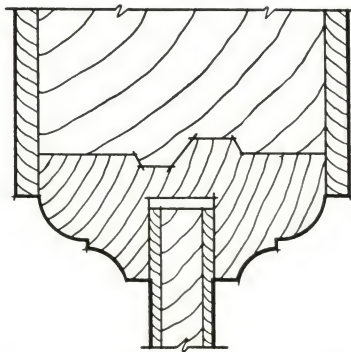


Special "H"

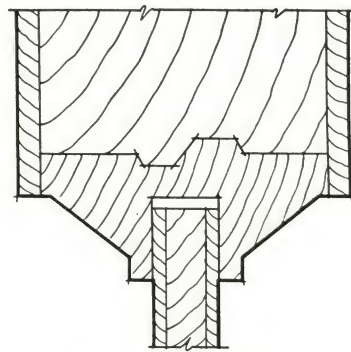
FULL SIZE DETAILS OF STANDARD (STOCK) DESIGNS OF $\frac{7}{16}$ " WIDE SOLID MOULDINGS



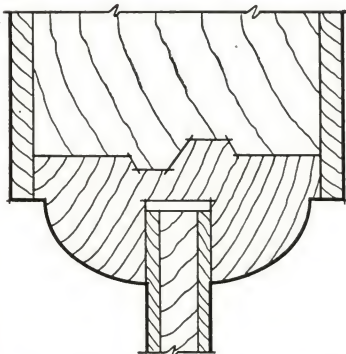
No. 2 Cove & Bead



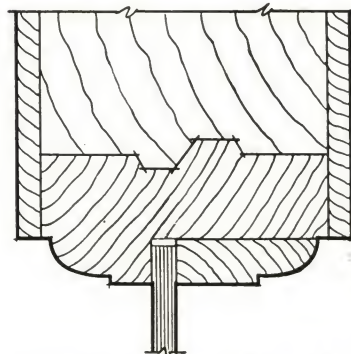
No. 25 Bead & Cove



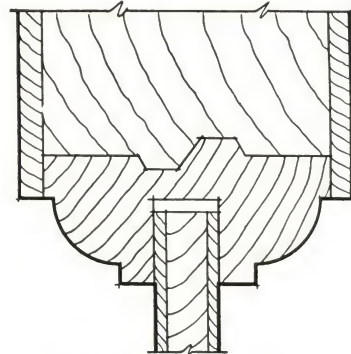
No. 295 P. G.



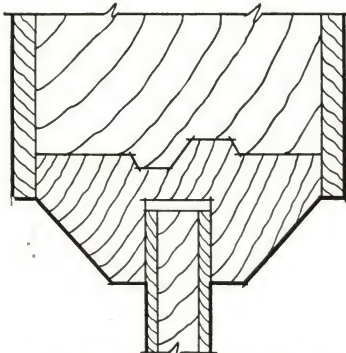
No. 70 Quarter round



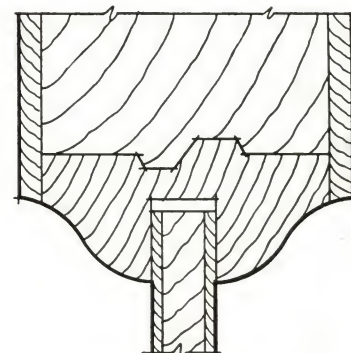
No. 35 Bead (Sash)



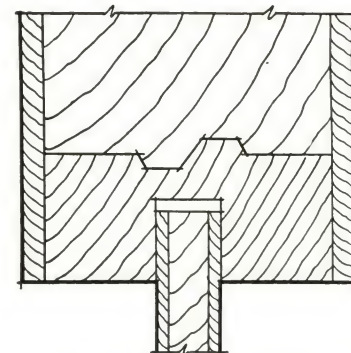
No. 147 Ovolo



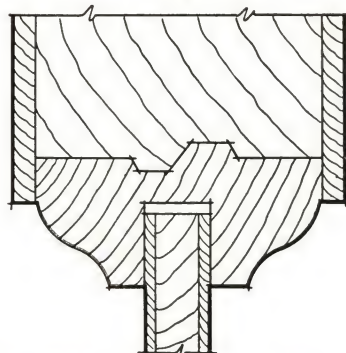
No. 440 Special P. G.



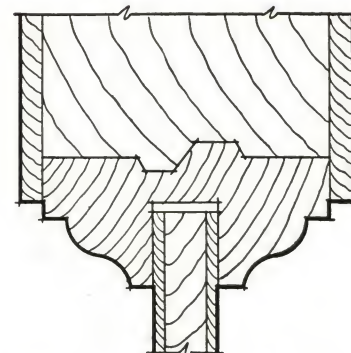
No. 52 O. G.



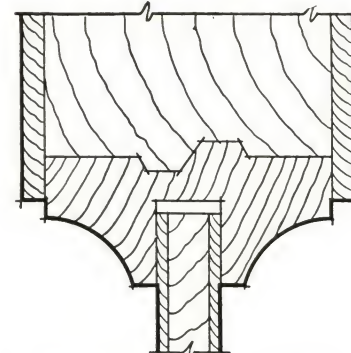
No. 77 Square



No. 531 Reverse O. G.



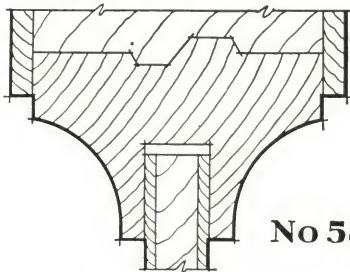
No. 288 Reverse O. G. with quirk



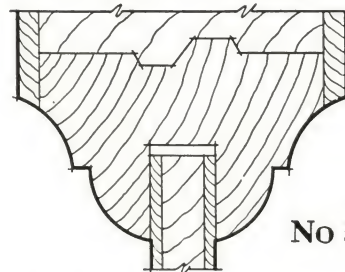
No. 384 Special Cove

SUGGESTIONS FOR $\frac{3}{4}$ " WIDE SOLID MOULDINGS

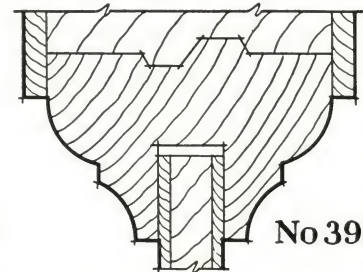
(TO REPLACE NAILED-IN MOULDINGS) On this page we present several cross-sections of solid mould profiles $\frac{3}{4}$ " wide which can be manufactured at a slight increase over the standard $\frac{7}{16}$ " or $\frac{1}{2}$ " mould. Architects will realize a very substantial saving per door by specifying a $\frac{3}{4}$ " wide solid mould of practical design in preference to a nailed-in flush mould. The solid mould eliminates the unsightly nail holes necessary in inserting the nailed-in mould and the possibility of the nailed-in mould pulling away from the stiles and rails.



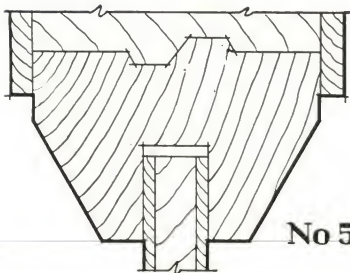
No 581



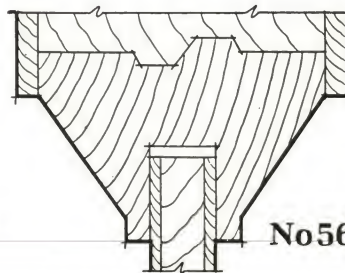
No 590



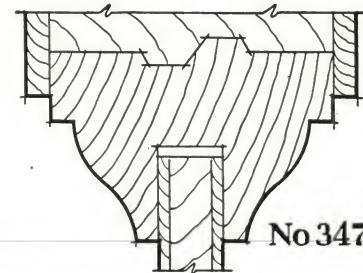
No 390



No 503

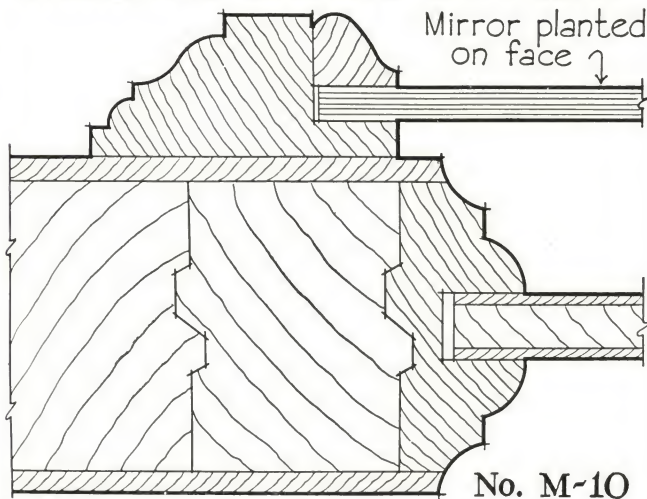


No 566

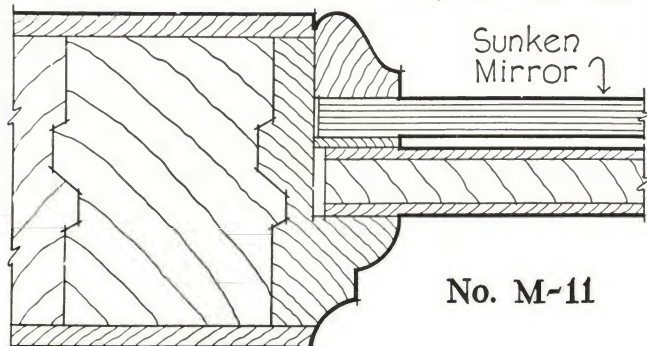


No 347

MIRROR DOOR DETAILS



No. M-10

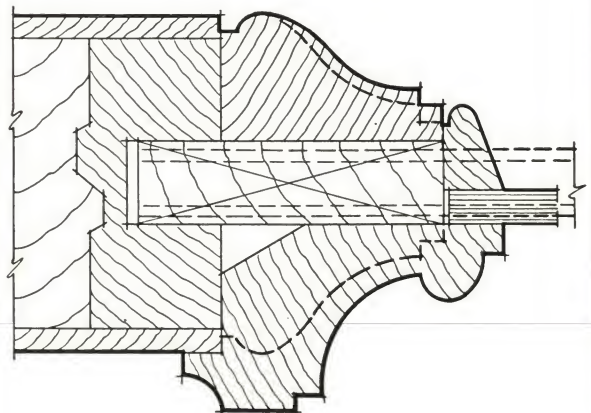


No. M-11

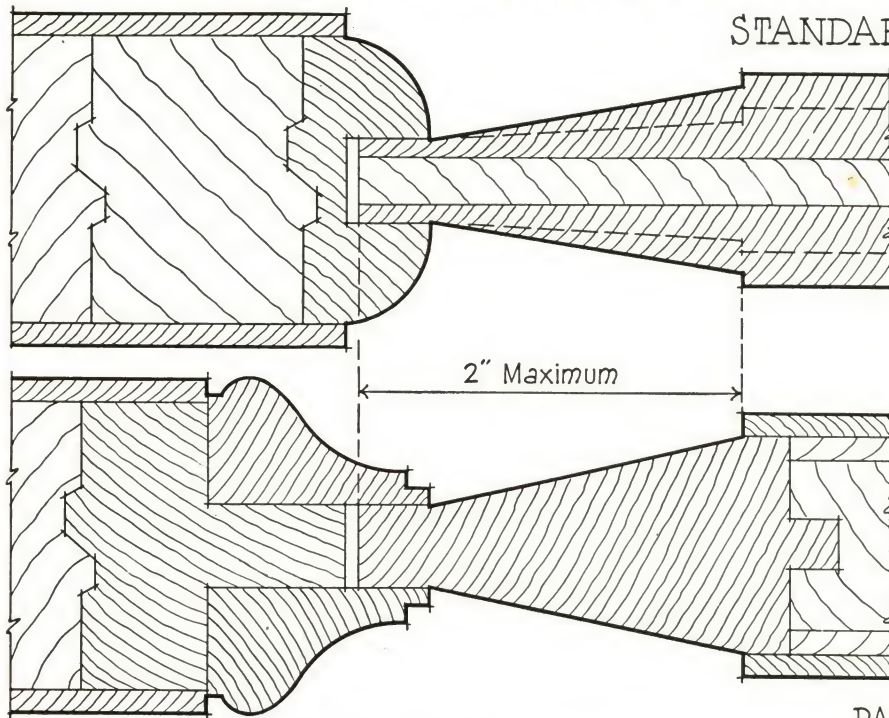
GLAZED DOOR DETAILS

Where nailed-in mouldings are required, it is suggested that details be drawn to stock profiles of flush and raised mouldings, as illustrated in the sketch below. The heavy lines indicate construction at glass with raised moulding one side, flush moulding one side and fillet. The dotted lines indicate the construction at panels with either flush moulding or raised moulding two sides.

Adherence to these profiles will prove an economy.



RAISED PANEL CONSTRUCTION



STANDARD $\frac{3}{4}$ " OR $1\frac{1}{8}$ " BEVEL RAISED PANEL CONSTRUCTION

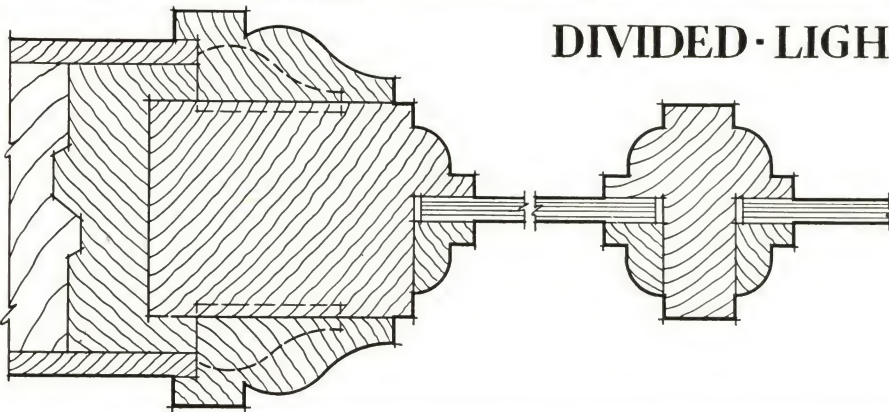
Specify $\frac{7}{16}$ " wide groove as thinner groove necessitates a heavier face veneer.

If possible specify panel raise as not over 2" from edge of panel to shoulder of raise. If this dimension is wider than 2" it results in difficulty in shaping which increases the cost.

Panel constructions adapted to either solid mouldings or nailed-in mouldings are illustrated.

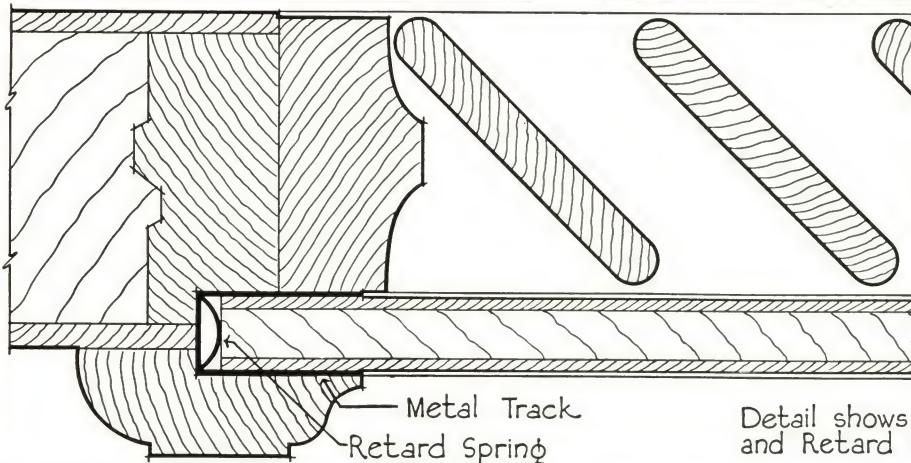
SUGGESTED MITRED RAISED FRAME PANEL CONSTRUCTION

DIVIDED-LIGHT DOORS



Wherever a nailed-in mould is specified on divided-light doors we recommend an insert frame as suggested in the accompanying detail.

We do not recommend bars coped to a nailed-in mould.



STOCK LOUVER SLIDING PANEL CONSTRUCTION

See cut of this door on page 5.

Detail shows Rail Section. Metal Track and Retard Spring on Stile Section only.

A FEW OF OUR RECENT DOOR INSTALLATIONS



(1) Apartment House, 480 Park Ave., New York, N. Y.

(2) Waldorf-Astoria Hotel, New York, N. Y.

(3) Barclay Hotel, Chicago, Ill.

(4) Financial Center Building, San Francisco, Cal.

(5) New York Athletic Club, New York, N. Y.

(6) Wellington Hotel, New York, N. Y.

(7) Von Steuben Junior High School, Chicago, Ill.

(8) Presbyterian Hospital, Denver, Colo.

(9) Residence, Winnetka, Ill.

FLUSH OR SANITARY DOORS

Construction Standards and Special Features—Specification Data

Door Construction

Our Flush Doors are of five ply laminated construction.

Kiln Drying and Seasoning of Material

Note: As a result of our special drying and seasoning methods we have practically eliminated the common defects in the ordinary stock door such as checks, ridges and waves in the face veneers and core joints showing through the face veneers. Our specially designed drying and seasoning equipment insures permanently smooth veneered surfaces in the finished doors.

Cores—All core blocks are kiln dried to from 3 to 4 per cent moisture in a specially designed core kiln.

Face Veneer and Cross-banding—All face veneer and cross-banding is thoroughly re-dried in veneer plate-driers and all moisture removed before the material enters the manufacturing plant.

After each gluing operation in the application of cross-banding and face veneer, the doors are allowed to season in our drying rooms to remove all excess moisture from the glue and to equalize all stresses and strains resulting from the gluing process.

Glue

We strongly recommend the use of a selected, high grade vegetable glue for interior doors. However, where specified and desired we can furnish our Flush Doors with the face veneers applied with waterproof glue. Laboratory tests have shown that this waterproof glue, although not affected by moisture, does not make quite as strong a glue joint as a high grade vegetable glue.

Core Material and Construction

Our Flush Door cores are built up of clear white pine blocks, seasoned and dried to 3% moisture in our specially designed core kilns. The core blocks are machined with a tongue and groove joint (see detail page 13), giving maximum gluing surface. The use of core blocks minimizes warping, since each block counteracts any warping tendency in adjacent blocks.

We consider our core block construction to be much superior to cores made up of strips or staves running the full length of the door, and have found from experience in manufacturing flush doors over many years that our type of core construction is superior to any other.

At the time of laying up the cores, a $\frac{3}{8}$ in. strip of hardwood, to match the face veneer, is applied to both vertical edges of the door. These hardwood edge strips provide a solid edge for supporting the door hinges and also protect the Pine core from atmospheric moisture.

The top and bottom edges of all of our flush doors are thoroughly painted before leaving the factory, thus protecting the exposed pine cores from moisture, and still making it possible for the doors to be trimmed and fitted, without breaking off the thin edge strips used by some manufacturers.

Cross-bandings

Our standard flush door construction includes heavy cross-bandings $\frac{1}{8}$ in. thick, since the best veneered surfaces can be obtained with the use of a heavy cross-banding between core and face veneer. After applying the cross-bandings to the core, the glue is allowed to thoroughly set, after which the door is run through double drum sanding machines to insure a perfectly flat, even surface on which the face veneers are applied.

Thickness of Face Veneers

We recommend the use of face veneers not to exceed $\frac{1}{16}$ in. thick before sanding, and in the case of cabinet woods—such as Mahogany, Walnut about $\frac{1}{32}$ in. and Quarter-sawn Oak—about $\frac{1}{20}$ in. thick. With our White Pine core construction and heavy cross-bandings, the use of heavier face veneers is not only unnecessary but undesirable, particularly where the face veneers have one or more joints. The joints in a thick veneer will show up through the finish after a time, to a greater extent than with a thin face veneer. In the manufacture of exterior doors we apply all face veneers with high grade waterproof cement, and do not advise thick veneers for that reason. Specifications should clearly indicate all doors which will be exposed to outside weather.

Note: See particularly "Selection of Hardwood Door Veneers," page 15.

Inlays

Beautiful and decorative effects can be obtained by Inlay on Flush Doors which recalls the finest in woodcraft of the past.

Inlaying is an ancient art and possesses a charm differing distinctly from other woodworking arts. Ebonyized wood and White Holly or a combination of both are generally used and show beautiful contrasting effects with almost any kind of face veneer. Special designs of inlay in varying foreign woods can also be furnished when specified.

By a special process, our inlays are firmly imbedded in the door and so perfectly fitted as to be without cracks or openings.

The standard width of stock inlay is $\frac{1}{4}$ in.

Sanding and Finishing

After the final operation of applying the face veneers and re-drying, all of our flush doors are carefully belt-sanded, using a hand block. This insures a perfect veneered surface, practically equal to a hand-smoothed job. The doors when they leave our factory are ready for the painter without the necessity of going over the face veneers with sandpaper.

In the event that standard drum or machine sanding is permissible, we make a reduction in cost.

Since we do not recommend top and bottom hardwood edge strips on flush doors, the top and bottom edges of all of our flush doors are thoroughly painted before leaving the factory to protect the exposed pine cores from moisture.

CONDENSED FLUSH DOOR SPECIFICATIONS

For full specifications see Page 18

All flush doors shall be five-ply veneered, as manufactured by the HARDWOOD PRODUCTS CORPORATION.

These doors shall be of a thickness specified by the architect.

Cores

White Pine with strips not over $1\frac{3}{4}$ in. wide, tongued and grooved and dried to from 3 to 4 per cent moisture.

Face Veneers

Unless otherwise specified, face veneers of Birch, Plain Oaks and Plain Gum, to be $\frac{1}{16}$ in. thick; cabinet woods, such as Mahogany and Walnut, to be $\frac{1}{28}$ in. thick (before sanding).

Edge Strips

Edge strips shall be not less than $\frac{3}{4}$ in. wide, of the same wood as face veneer. Top and bottom edges of doors to receive two coats lead and oil before leaving factory.

Cross-bands

Cross-bands to be $\frac{1}{8}$ in. thick.

Inlaid

All inlaid doors shall be stained before inlaid, with approved color, to prevent staining of inlays. Inlaid doors to be given one coat of shellac after inlay and before shipping.

GUARANTY

We unqualifiedly guarantee every HARDWOOD PRODUCTS CORPORATION door, made according to our recommendations and as described in this Manual, to be free from defects of workmanship and materials, and will replace any doors that prove to be defective within the meaning of our specifications and recommendations.

X-RAY OR LEAD-LINED FLUSH DOORS

Note: As a standard construction we have adopted specifications similar to those prescribed by the New York State Building Code, which we believe to be superior to any other type of construction.

Kiln Drying and Seasoning of Material

Note: Our specially designed drying and seasoning equipment insures permanently smooth veneered surfaces in the finished doors.

Cores—All core lumber is kiln dried to from 3 to 4 per cent moisture.

Face Veneer and Cross-banding—All face veneer and cross-banding is thoroughly re-dried in veneer plate-driers. After each gluing operation, the doors are allowed to season in our drying rooms to remove all excess moisture from the glue.

Glue

A special glue is used to apply the cross-banding to the lead center. Elsewhere a selected, high grade vegetable glue is used.

Core Material and Construction

In preparing the core for the lead-lined door, we have a special process which enables us to glue two layers of $\frac{1}{8}$ in. cross-banding to the $\frac{1}{8}$ in. thick lead center. A layer of $\frac{3}{4}$ in. hardwood lumber core is then applied on each side after which the entire cored slab is bored and bolted together with large

flat head elevator bolts which are spaced 8 in. on center. The bolts are countersunk about $\frac{1}{8}$ in. and the space above the bolt heads is then filled by a tight-fitting lead plug driven flush with the surface of the hardwood core. See detail, page 13.

In order to eliminate difficulties with bolts in mortising lead-lined doors for locks, we leave a space about 3-0 from the floor on one edge of the door and mark this edge for identification purposes by boring a shallow hole on the top of the door on the lock side edge.

Cross-bandings

Our standard flush door construction includes heavy outside cross-bandings $\frac{1}{8}$ in. thick.

Thickness of Face Veneers

We recommend the use of face veneers not to exceed $\frac{1}{16}$ in. thick before sanding and in the case of cabinet woods—such as Mahogany, Walnut about $\frac{1}{28}$ in. and Quarter-sawn Oak—about $\frac{1}{20}$ in. thick.

Sanding and Finishing

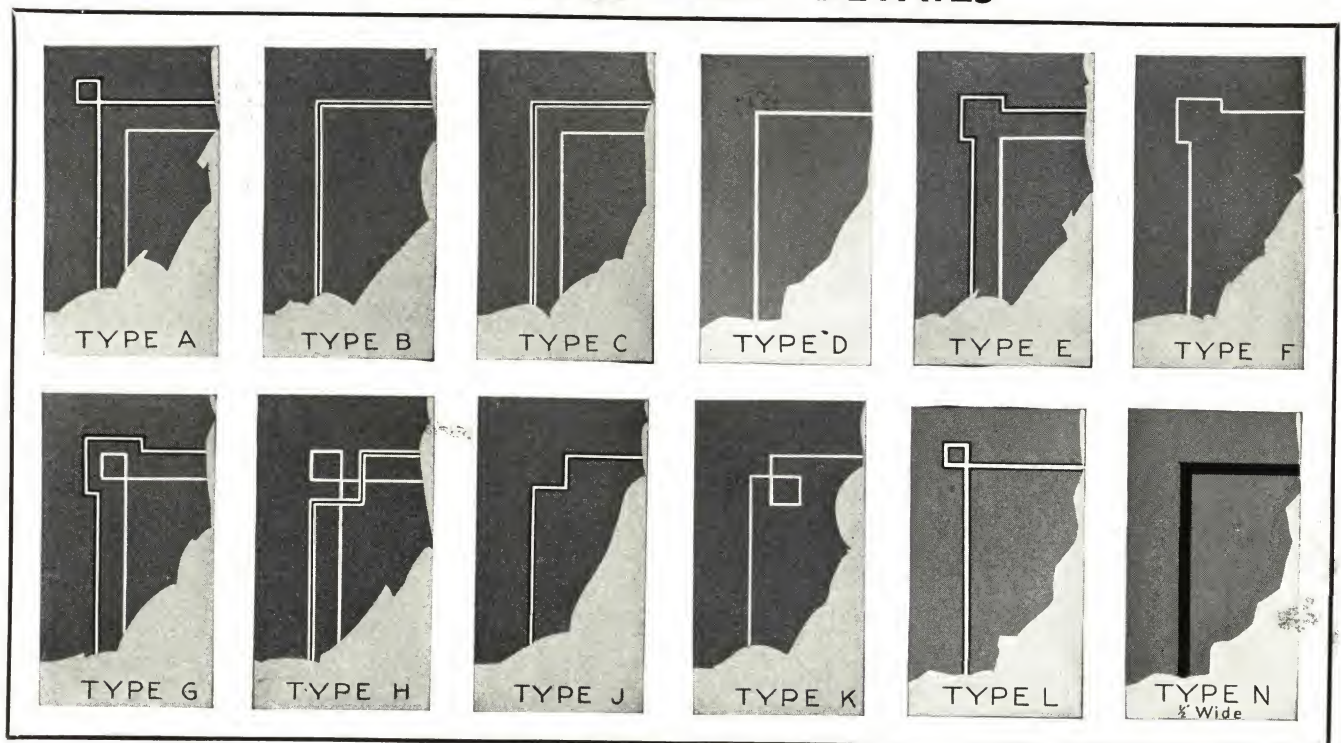
After the final operation of applying the face veneers and re-drying, all of our flush doors are carefully belt-sanded using a hand block. This insures a perfect veneered surface, practically equal to a hand-smoothed job, ready for the painter without the necessity of going over the face veneers with sandpaper. In the event that standard drum or machine sanding is permissible, we make a reduction in cost.

SOUND-PROOF FLUSH DOORS

The manufacturing construction standards and special features applying to our Standard Flush or Sanitary Doors as set forth on page 10 apply likewise to our Sound-proof Flush Doors. The door is made up of two $\frac{3}{4}$ in. thick Flush Doors glued to a $\frac{3}{8}$ in. center of sound absorbing Flax-li-num. The

Flax-li-num center is surrounded with a hardwood edge $2\frac{1}{2}$ in. wide and $\frac{3}{8}$ in. thick of the same wood as the face veneers, forming a solid wood edge around the perimeter of the door. Tests prove this construction highly sound insulating. See detail, page 13.

FLUSH DOOR INLAY DETAILS

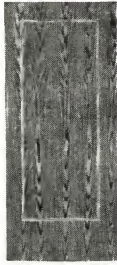
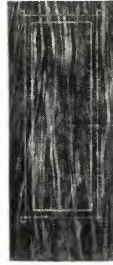


STANDARD AND SPECIAL FLUSH DOORS

For Details of Standard Inlays, See Page 11



N-590

N-590
B InlayN-590
A InlayN-590
D Inlay and NumeralsN-590
Spec. Inlay

N-591



N-595



N-596

N-597
H Inlay

N-598



N-604



N-605

N-590
Louver

N-600



N-607



N-608



N-610



N-610 1/2



N-611



N-612



N-614



N-618



N-655



N-656



N-657



N-658



N-659



N-660

N-660
CrestN-661
Lantern

N-661



N-662



N-663



Radio A



Radio B



N-664



N-665

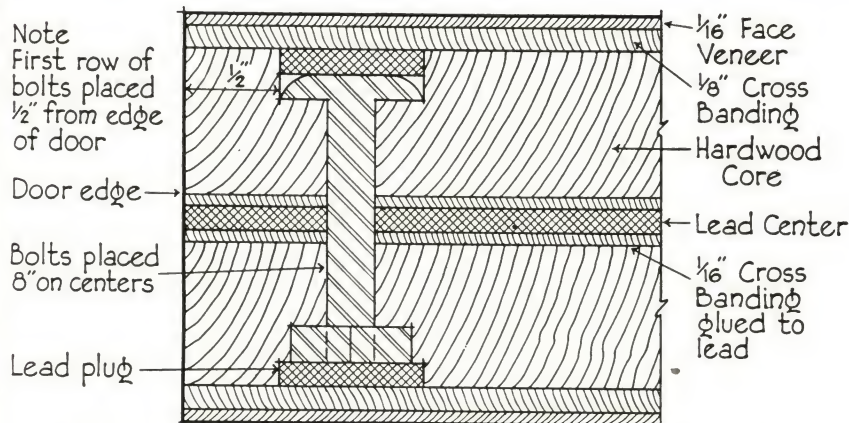
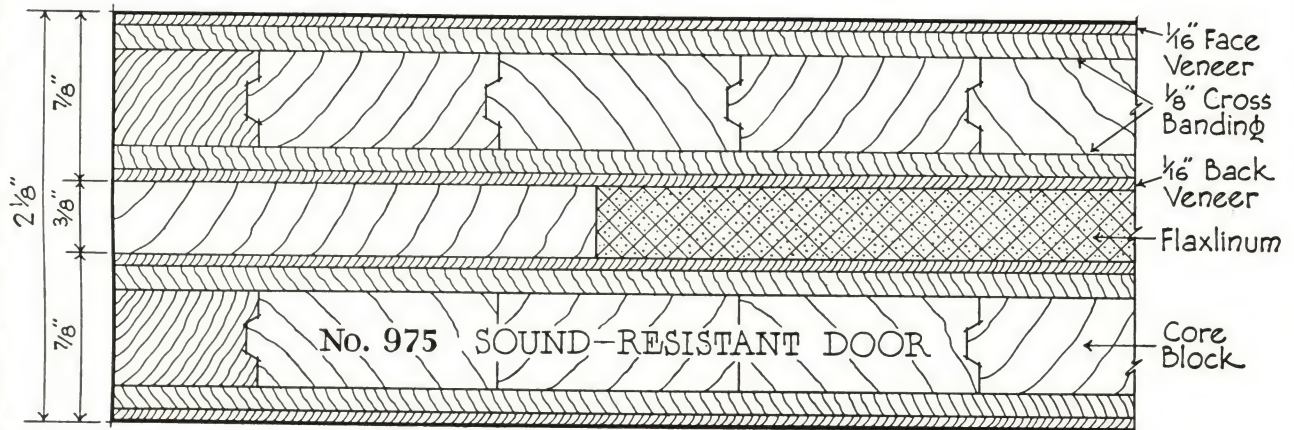
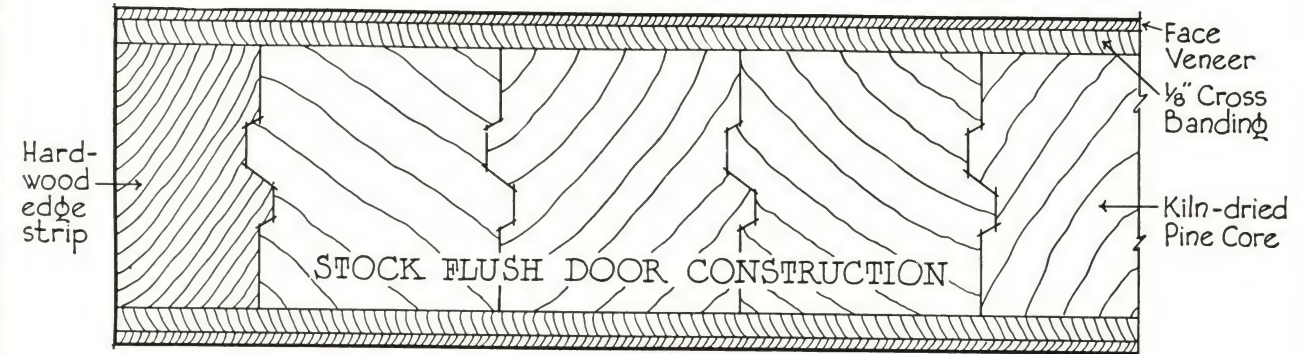


N-675

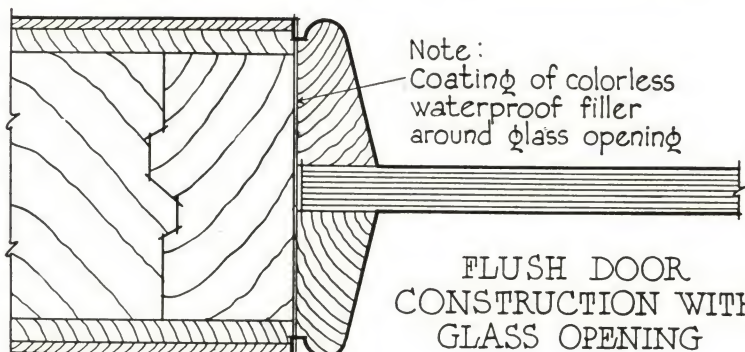
Flush Raised
Panel

N-680 (Grooved)

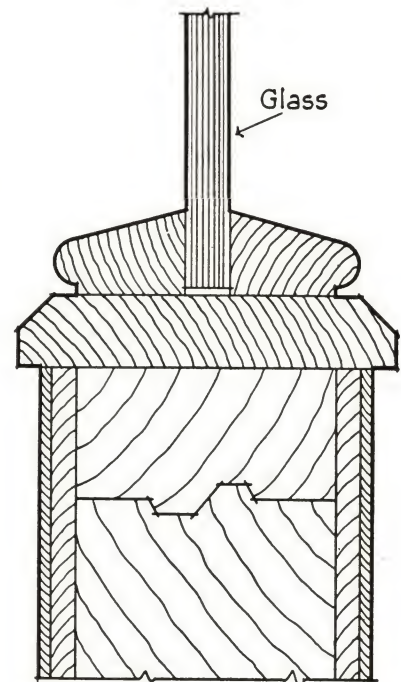
FLUSH OR SANITARY DOORS



LEAD LINED FLUSH DOOR CONSTRUCTION



FLUSH DOOR CONSTRUCTION WITH GLASS OPENING



SUGGESTED DETAIL FOR EXTERIOR GLAZED FLUSH DOORS

FIRE-PROOF WOOD DOORS

Fulfill New York Building Code Requirements

The HARDWOOD PRODUCTS CORPORATION have a complete plant for fire-proofing wood and are manufacturing doors made of this fireproof wood which will meet the rigid requirements of the building code of the City of New York.

The lumber is treated with chemicals, whose functions are threefold: they give off, when heated, a non-inflammable, fire-extinguishing gas; they fuse over the wood in a protective coating; and they exclude the oxygen necessary to combustion by obstructing the pores of the wood.

Method of Treating Lumber

All lumber and core material to be treated for fire-resistant qualities is first kiln-dried and then placed in a steel cylinder. The cylinder is then closed and the air exhausted and the interior of the cylinder kept under a vacuum for several hours. The fire-proofing solution is then admitted to the cylinder and forced into the cells of the wood under pressure until the wood is thoroughly impregnated.

The material is then removed from the cylinder and subjected to air-drying for from two to three weeks and is then again placed in dry kilns. The kiln-drying process ordinarily takes from four to five weeks depending upon the thickness and texture of the lumber to be dried. Items of veneer up to $\frac{1}{4}$ in. thick can be fire-proofed, air-dried and kiln-dried in from two to three weeks.

After the doors are delivered, the Building Inspector in New York City takes a certain number of doors at random from the shipment and cuts them up into samples which are then taken to the laboratory at Columbia University at New York and tested in the presence of a representative from the New York Building Department. There are three different tests made from each sample of wood, known as the "timber test" the "crib test," and the "shaving test" as follows:

Fire-proof Tests

For the timber test, samples $\frac{3}{4}$ in. x $1\frac{1}{2}$ in. wide are put over a crucible furnace at a temperature of 1700° Fahrenheit for two minutes. After they are removed from the flame, the flames must not persist longer than 15 seconds, nor the glow longer than 20 seconds. The unburned area should not be less than 55% for hardwoods and not less than 45% for softwoods.

For the crib test, the samples are $\frac{1}{2}$ in. square and 6 in. long, and are built up crib fashion over a Bunsen burner and exposed for a period of one minute at a temperature of 1200° Fahrenheit. The flame must not persist for more than 20 seconds after the burner is removed and the glow for not more than 30 seconds.

For the shaving test, the shavings about 2 in. deep are placed in a wire mesh basket and packed down moderately to reduce the air space. A Bunsen yellow flame is placed beneath and in contact with the shavings and removed after 25 seconds. The flame should not show higher than 6 in. above shavings and shavings should not be consumed in less than 5 minutes.

All samples taken from doors as above described have to pass these three tests before doors are accepted.

Recent Fire-proof Door Installations

Doors supplied by our company manufactured of fire-proofed wood under our process have been installed in a large number of buildings in recent years, including the following buildings of prominence in New York City:

Waldorf-Astoria Hotel	Piccadilly Hotel
Hotel Pierre	Madison Hospital
The New York Athletic Club	Down-Town Athletic Club
Victoria Hotel	New Weston Hotel

We can supply millwork manufacturers with lumber impregnated in our plant which will meet the requirements of the Building Code of the City of New York.

NEW YORK STATE SPECIFICATION DOORS

MADE EITHER FLUSH OR FRAMED-PANEL CONSTRUCTION SKETCH AT LEFT SHOWS FLUSH CONSTRUCTION

Wherever required, we are equipped to furnish doors according to NEW YORK STATE SPECIFICATIONS which provide for alternating full length core strips on the stiles and rails, and $\frac{1}{4}$ -in. face veneers, to finish $\frac{1}{8}$ in. after sanding.

The accompanying elevation shows the accepted construction for flush doors.

The construction for the Framed-Panel door provides also for alternating full length core strips on stiles and rails with $\frac{1}{8}$ -in. finished face veneers, while the panel construction is generally the same as stock doors.

Unless otherwise specified, dowel construction and machine sanding is furnished, although mortise and tenon and belt or hand sanding can be furnished if desired.

This type of door can be furnished in either fire-proofed or non-fire-proofed construction.

Our extensive activities in New York State, particularly in the Metropolitan area, have naturally necessitated our quoting on and manufacturing door jobs requiring New York State Specifications.

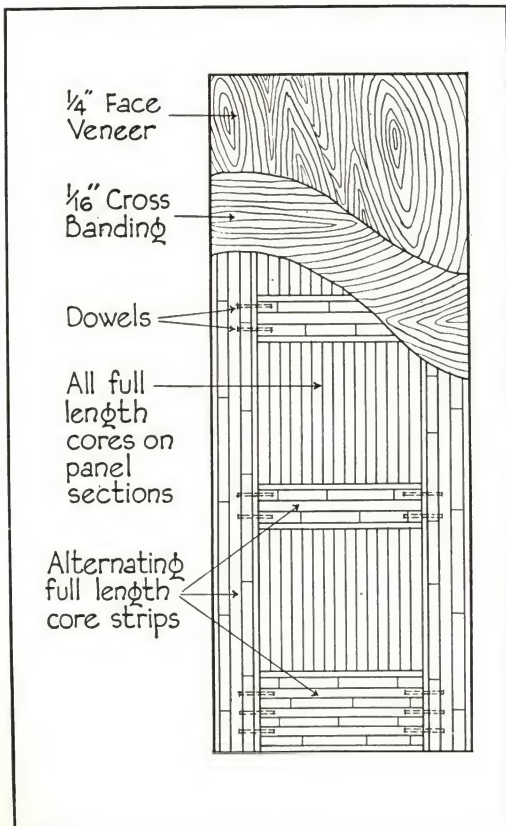
The commendatory comments which we have received on such jobs on which we have furnished doors to these specifications justifies our conviction that our manufacturing methods have met the severe requirements of the Building Department of the State of New York.

While the cost of constructing doors to these specifications is somewhat higher than the regular stock design, the construction, nevertheless, is very practical, and has been adopted on many other jobs that would not ordinarily come within the jurisdiction of the New York State Building Code.

We quote below several outstanding installations on which we have furnished doors during the past few years, according to New York State Specifications:

Utica State Hospital (Treatment Bldg. No. 1), Marcy, N. Y.
Hudson River State Hospital (Staff Apts. and 2 Nurses Homes), Poughkeepsie, N. Y.
State Normal School (Practice School), New Paltz, N. Y.
Centralslip State Hospital (1 Building), Centralslip, Long Island, N. Y.
Pilgrims State Hospital (1 Building), Brentwood, Long Island, N. Y.

Our usual guaranty applies to all doors which we make according to New York Specifications.



PRACTICAL SUGGESTIONS AND ECONOMIES

Detailing and Specifying Wood Doors

Doweled versus Mortised and Tenoned Construction

Advantages of Doweled Construction—A surprisingly large number of special doors are still detailed or specified with mortise and tenon joints, in spite of the fact that stock doors are no longer made that way.

The present doweled construction was developed to *conserve material, reduce warping, speed up production, and prevent the introduction of the considerable amount of moisture which the glue on large tenons carries into the stiles*. It also simplifies the construction of cores for rails as in the older superseded method it was necessary to make all the core blocks on the ends of the rails at least as long as the tenons are deep—a waste with no resultant benefit.

Conclusive Tests—There has naturally been considerable controversy on the relative merits of the doweled construction as compared with the mortised and tenoned construction in veneered doors. We recognized the uncertainty in the minds of some architects as to the relative merits of these two types of construction and accordingly conducted exhaustive tests through the College of Engineering, Cornell University, on twelve of the best obtainable mortised and tenoned construction stock doors and twelve of our own standard doweled construction doors picked at random from local warehouse stock. This test proved conclusively that the doweled construction is equal to or better than the mortised and tenoned construction. The tests not only covered those for comparative strength but for comparative reaction through varied humidity conditions. We have on file the complete results of these tests and will be glad to furnish a summary on request.

Mortised, Tenoned and Wedged Construction—However, we have complete equipment for mortising and tenoning doors and will furnish veneered doors with this construction, at an additional cost, provided the specifications definitely call for this type of construction. We can also manufacture doors with the mortised, tenoned and wedged construction, which is far superior to the ordinary mortised and tenoned construction. The wedged construction, in addition to the mortise and tenon, makes a very favorable comparison with the doweled construction and has been specified frequently, particularly on Government jobs. The wedged construction naturally costs a little more than the ordinary mortised and tenoned construction.

Selecting and Specifying Face Veneers

How Best to Define the Quality—One of the most important, and at the same time, most difficult items of fine millwork and cabinetwork specification is the defining of the figure and quality in veneers. Millmen cut all the defects out of exposed veneers as a matter of course, but do not always furnish the kind of figure the architect desires nor buy as expensive veneers as he expects.

To merely specify "well marked" or "highly figured" veneers is not explicit enough. If the architect is not sure of exactly what species, method of cutting, sapwood restrictions, and amount of figure he requires, it will be far simpler for him to secure samples than have the millman make changes after the work has been delivered to the job.

Veneer manufacturers are usually glad to submit samples of figured veneers of the various species, together with the prices charged for them. The price of quartered figured red gum veneers vary from 1½ to 6¢, walnut veneers from 2½ to 15¢ a square foot, and other high priced veneers in about the same proportion.

It is suggested that architects, when they have described the veneers, and have required that samples be submitted for their approval, shall also definitely specify the prices to be paid for the highly figured veneers. Then the different cabinetmakers who figure on the work can use the same veneer cost in making up their estimates and so compete on an equal basis.

There are three methods of making veneer: rotary cutting, by which the veneer is peeled from a log revolved on a lathe, slicing and sawing. The method used is determined by the character of the wood, the figure desired, and the value of the veneer. Over 90% of all veneer is produced by the rotary process.

Veneers used on hardwood doors are free from all defects. The term "selected," which to some architects means freedom from knots, checks and other defects, is used by the door manufacturer to indicate selection for color or figure.

Veneer Thickness—The specification of veneer thickness should state whether it is to be before or after sanding, preferably the former. Sanding takes off about ⅜ in. The standard thickness of rotary-cut face veneer for stiles and rails of panel doors and for slab doors which are not cross-banded is ⅜ in. before sanding. Panel or flush door veneers may be ⅜ in. The most expensive woods are cut thinner, particularly for panels, ⅜ in. and even ⅜ in. being not uncommon. The heavy veneers often used on the stiles and rails of outside doors are usually resawed from lumber, ¼ in. thickness before sanding being standard.

It is well to remember these standard thicknesses when stating the thickness to be required so that unnecessary expense and sanding may be avoided. A door on which veneer ⅜ in. after sanding had been specified would cost as much as one with veneer ⅜ in. after sanding because both doors would be made with standard ¼ in. veneer, and sanded to the required finished thickness.

Unselected or Selected for Color—Nearly all the hardwoods used for face veneers have a ring of light colored sapwood several inches wide around the outside of the log. In some species this sapwood necessarily forms a large part of the veneer production, so the specification of all hardwood veneer increases the cost considerably. Whenever dark stains or enamel finishes are to be used it is economical, and just as satisfactory, to use veneer which has not been selected for color. A typical case of where such a saving could have been made was that of an architect who recently specified "selected red birch" doors and then, just before shipment, asked that they be primed for an enamel finish. In this case the insertion of the two words "selected red" cost the owner \$600 on a \$6000 door contract, and no benefit resulted.

Birch—Birch veneer used in doors is nearly all cut from trees known botanically as yellow birch. The smaller more defective red birch trees produce most of the curly birch veneer used in cabinetwork, but the species is little used in door manufacture. For this reason red birch means, to the door manufacturer, the heartwood of the yellow birch tree and refers to color rather than species. For doors to be given light natural finishes the specification "selected red for color" increases the cost over unselected birch by about 10%. Selection of all sapwood veneer is unusual as the figure, though much the same after staining, is not so pronounced as that of heartwood when light finishes are used, and of course there is no reason for using any but unselected veneer when dark finishes or enamel will give the surface a uniform color. Birch is rarely selected for figure as nearly all of it is well marked. Most of it is rotary-cut as other methods do not give the characteristic pleasing figure. Some veneers thicker than ⅜ in. are resawed from flat sawed boards because very thick rotary cut veneer is apt to split.

Gum—Gum, which is usually rotary-cut, comes from the red gum tree, but contains much sapwood that is almost white. Unselected gum may contain any percentage of sapwood, and usually has both heart and sap on the same door. Doors veneered with gum selected red for color cost about 25% more than unselected. Occasionally rotary-cut gum is selected for both red color and prominent figures, but the figure to be obtained by this selection should not be confused with the more expensive quartered figured red gum.

Quartered Figured Gum—Quartered figured gum is cut radially from occasional freak logs. Sliced veneer is used for panels and sawed veneer for stiles. Its price, like that of figured walnut, varies considerably, so the submission of samples or the specification of the price of veneer to be used will often avoid misunderstanding. Prices per square foot vary for quartered gum from 1½ to 6¢, so an indefinite specification allows a great deal of latitude. Veneer manufacturers will usually supply architects with free representative samples of the different priced veneers.

Red Oak—The oaks, because of the wide variety of their figure and coloring, cause more than their share of misunderstanding between architects and manufacturers. Red oak is rotary-cut or, for thick veneers, flat sawed as it has little figure when quartered. The bold flat sawed figure is characteristic of nearly all red oak veneers, and also of brown ash, a wood which is recently becoming popular for doors. Rules for grading veneers permit sap and minor discolorations, just as lumber grading rules do, so if the doors are not to be fumed or stained, it is desirable that veneers be selected for uniform color. This costs about 10% extra. The Northern oak commonly used on doors has but little sap, however, and careful staining will give a satisfactorily uniform color.

White Oak (Plain and Quartered)—White oak may be rotary-cut or quarter-sawed. Quartered veneers are always sawed rather than sliced because the medullary rays or "flakes" chip out in slicing. Quarter-sawed strips of veneer have up to 1½ in. of sapwood on one edge so the elimination of this sap means cutting off and throwing away a part of the veneer rather than merely selecting pieces of heartwood as is done in birch or gum. Sometimes this may cause the loss of fully a fourth of the material.

Rotary-cut white oak costs 5 to 10% more than red oak. Quarter sawing adds about a third, and selection for uniform color perhaps another 25% to the cost of rotary cut. Occasionally, selection is also made for prominent or medium flake in quarter sawed stock. Otherwise, any well marked quartered veneer will be used, though in any case all of a panel is usually made from the same flitch to avoid glaring contrasts.

Walnut—American walnut is rotary-cut or sliced, the latter method being used in the production of most highly figured veneers. Unselected walnut, like unselected veneers of several other species, may contain a large percentage of light colored sapwood. This light colored sapwood is difficult to detect from heartwood after skillful staining, but when the doors are shipped entirely unfinished, it not infrequently causes rejection by the architect, even though selection for the well known black walnut color has not been specified. For this reason some manufacturers make it a practice to stain the sap on all unselected walnut doors they make. The wide variety in the figure and cost (from 2½ to 15¢) of any but unselected walnut makes it desirable to submit samples or to specify the cost of the veneer when describing the veneer to be used.

Mahogany—Lumber and veneers of a number of species have been sold as mahogany. All the species of true mahogany are confined to Central America and adjacent portions of Mexico, South America and the West Indies. Khaya, or African mahogany, as it is commonly called, comes from the west coast of Africa and looks so much like true mahogany that it is difficult for anyone but an expert to tell them apart. The use of the name Philippine mahogany has been restrained by the Federal Trade Commission, so now the various species formerly sold under that name are known as Philippine hardwood.

Mahogany logs are usually sliced or sawed radially for veneer in order to secure the characteristic "ribbon" figure, so veneer, unless it is heavy veneer sawed from lumber, is usually more or less striped even when not ordered that way. Very highly figured veneers are available in mahogany, as in walnut, but they are not much used in door manufacture. There is considerable variation in color, but selection for uniform color is seldom required because of the stains used in finishing. Sapwood is mostly hewn off the logs before they are hauled from the forests so veneers are all heartwood. Doors made of Central American mahogany cost about 10% more than African mahogany doors. African mahogany is somewhat coarser textured than true mahogany, but the characteristic ribbon strip is just as pronounced.

Philippine Hardwood—The color of the Philippine hardwoods formerly sold as Philippine mahogany ranges from a deep reddish brown to straw color. Veneers are described as either red or light brown, doors veneered with the red stock costing 8 to 10% more than the light brown. The selection

of Philippine hardwood veneer and its finishing are much like that of mahogany.

Economy in the Design of Special Paneled Doors

Introduction—Manufacturers of stock hardwood doors are continually studying their designs and methods of construction trying to build doors better and more economically. Since special doors are made in the same plants by the same machinery, and by much the same processes as are stock doors, the architect, in detailing his special doors, should not depart from standard construction more than is necessary to secure the effect he desires. One of the greatest advantages of wood doors is the ease with which the architect may carry out his own ideas of design at a reasonable cost. Often, details come to door factories which increase the cost considerably with no resulting improvement in the doors. Construction which looks all right to one not thoroughly familiar with the actual manufacture of doors may be impractical from a production standpoint. In this article will be pointed out some of the most common of these departures from standard practice, except those that relate to veneers and panel construction.

Spline or Fillet Not Necessary—In Figure 1 is shown the old method of detailing a panel door with a fillet to which the molding is nailed. On the right is the preferred detail in which the panel is carried into the stile, giving stronger, cheaper and more rigid construction. When molded doors were built with solid panels the fillet held the molding close to the stile when the panel became narrower due to shrinkage. This shrinkage need not be considered now, as in the modern plywood panels the shrinkage is negligible. Distortion, if any, is that of twisting, so it is desirable that the panel be firmly anchored to the stiles and rails. This removes all stresses from the mouldings and allows their use as decorations only. When it is necessary to use a wide solid panel the fillet may serve a useful purpose, but nearly all wide panels are now of plywood construction.

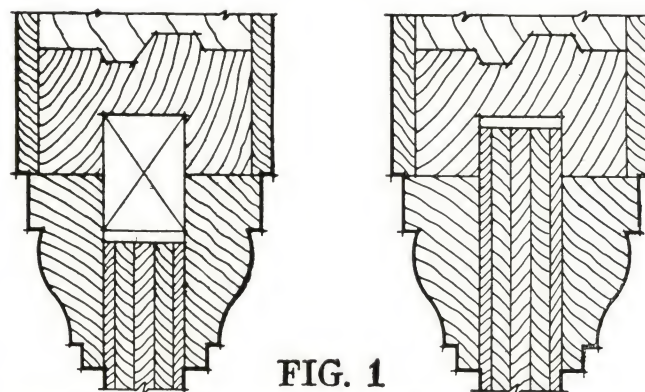


FIG. 1

The Construction Shown on the Right, without the Spline, Is Preferred

Economize by Specifying Solid Sticking Wherever Possible—A door which has the molded effect stuck on the stiles and rails costs 75¢ to \$1.00 less to manufacture than does a moulded door, and does not have the nail holes or the possibility for imperfect joints in the moulding that are found in a molded door. For these reasons it is desirable to use sticking wherever possible. It is desirable to hold sticking down to ⅜ in. in width, and to be sure that none of the profiles overlap, as the moulding is all cut with one knife on the sticker. In Figure 2 is shown an actual detail of a moulded door and, on the right, an altered design which could have been readily stuck on the stiles and rails. Where the effect to be secured requires that the profiles of the molding overlap, it is, of course, impossible to stick the design, but often the change necessary for sticking can be effected without greatly changing the design. Few door manufacturers venture to change an architect's molding details in the slightest, but the architect himself often can very easily.

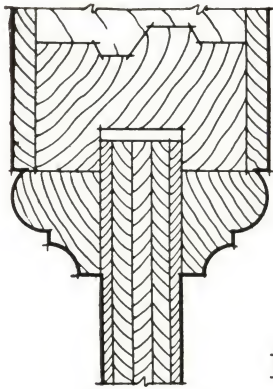


FIG. 2

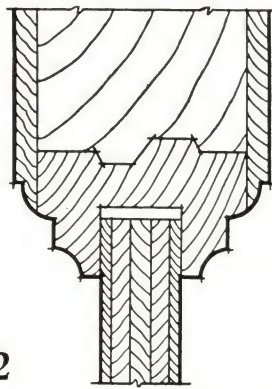
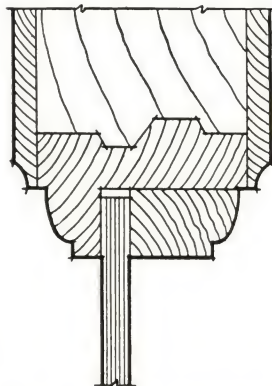
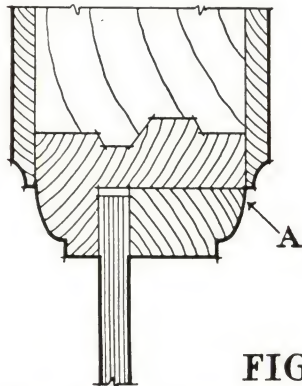


FIG. 3

Narrow Mouldings Can Often Be Stuck on the Stiles and Rails with but Minor Changes in Design. The Detail Shown on the Right Is \$.75 to \$1.00 Cheaper per Door (One Panel Design) Than the Molded Detail on the Left

Specify Type of Moulding Around Glazed Lights—On paneled doors, with divided glazed lights above, specified with flush or raised molding, the millman should know whether the molding is to go around both lights and panel or the panel only. If such a molding is required around the divided opening, it necessitates the use of an inserted sash (see detail, page 8), since it is almost impossible to stick bars and muntins to match flush moldings. One dollar to \$1.25 a door will be saved by designing bars and muntins which can be stuck. If they are designed for sticking, it is easy to stick the stiles and rails too with the same knives, and then rout out the stiles and rails around the panel to receive the molding.

How to Detail Stuck Mouldings—In detailing stickings for stiles and rails care should be taken to see that none of the molded surfaces coincide with the glue line of the face veneer as more or less chipping of glue and wood is bound to occur during sticking. Figure 3 shows a typical example of this sort. By carrying the cut down $\frac{1}{2}$ in. or so into the edging strip, any chance for chipping at the joint will be avoided.



When the Detail Requires a Cut Too Close to a Glue Line, as at A, Chipping Is Apt to Result. By Carrying the Cut Below the Glue Line (right) This Chipping Can Be Prevented

Avoid Feather Edge Sticking—Whenever the stuck surface meets the face of the stile at but slight angle, a feather edge must be tenoned on the end of the rail. This tenon is hard to machine and assemble, and the joint nearly always shows as an irregular line after sanding. When face veneer is $\frac{1}{8}$ in. or less in thickness it is a good idea to show, where the contour of the sticking will permit, a right angle cut from the face of the stile down through the veneer, and into the edging strip at least $\frac{1}{2}$ in. This conceals the glue line in the angle, and helps make a firm true joint between stiles and rails. See Figure 4.

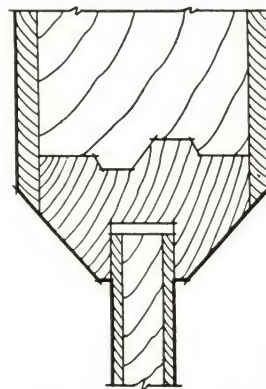
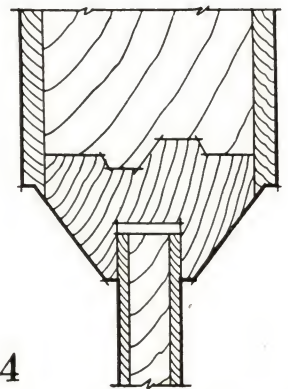


FIG. 4



A Bevel or a Shallow Curve Which Runs to the Surface of a Stile Makes a Difficult Joint to Machine and Usually Makes the Joint Show as an Irregular Line After Sanding. The Construction Shown at the Right Is Better

How to Specify Flush Mouldings—Flush mouldings should, where possible, be brought out almost even with the surface of the stiles and rails, or at least near enough to cover the joint between the core and the face veneer. If the moulding is so low that the glue line is exposed, edging strips on the inside of the stiles and rails are necessary just as though they were to be stuck instead of moulded. The addition of these hardwood edging strips is expensive, and increases slightly the tendency of the stiles to warp.

Doors with Two Kinds of Veneers

Avoid wherever possible doors of two kinds of wood on opposite sides (particularly those $1\frac{3}{4}$ in. thick), due to the tendency to warping and twisting. Where this cannot be avoided, refrain from specifying rabbeted jamb or plowed-in stops—planted stops may be adjusted to accommodate twist, etc.

Combined Flush and Paneled Doors

Do not design a door of flush or sanitary type on one side and paneled on the other on account of tendency to twist.

Exterior Doors

Exterior doors should not be less than $1\frac{3}{4}$ in. thick, and if paneled doors, with stile and rail veneers not less than $\frac{1}{4}$ in. thick before sanding. Panels should be five (5) ply. If flush doors are used, requiring joints in face veneer, use thinner veneer (see page 12). Use water-resisting glue only.

Muntins

Muntins for glazed doors should not be less than $\frac{1}{2}$ in. between glass.

Door Thickness

The following should be made not less than $1\frac{3}{4}$ in. thick: doors over 2 ft. 8 in. wide; doors with one long panel; flush or sanitary doors.

Mouldings

Solid stuck moulding should not be detailed over $\frac{3}{4}$ in. wide. For moulded doors, do not detail mouldings for $1\frac{3}{8}$ in. thick doors over 1 in. wide or for $1\frac{3}{4}$ in. thick doors over $1\frac{1}{8}$ in. wide.

Sanding

All doors, unless otherwise specified, are machine sanded. If a high grade finish is desired, belt sanding or hand sanding should be specified. Belt sanding costs less than hand sanding. All flush doors should be belt sanded.

MASTER SPECIFICATIONS

Hardwood Veneered Doors

Note: Notes are explanatory or advisory only and are not to be included in the specification.

Note: Select and include only those clauses which apply to the particular work. Words or clauses within brackets in italics are selective.

(1) Work Included

Note: List and locate doors to be included under this specification, either in schedules on plans or under this heading. If in schedules on plans, refer here to Sheet No.

(2) General

(2a) All (veneered) (and) (solid) wood doors shall be as manufactured by HARDWOOD PRODUCTS CORPORATION, Neenah, Wis., or equivalent, meeting fully this manufacturer's standards of materials and construction as set forth in their catalogue in the current edition of SWEET'S ARCHITECTURAL CATALOGUES.

(2b) All wood shall be fireproofed to meet the prescribed tests of the Building Code of the City of New York.

(2c) Doors shall be of sizes indicated (on plans) (in schedules on plans) and of design (detail) (specified under types).

Note: For standard sizes, see page 1

(3) Types

Note: Select type. If more than one type is to be included, list and locate each under a separate heading.

(3a) Doors shall be Standard (stock) design No. (specify No.).

Note: See "Construction Standards," page 2.

(3b) Doors shall be Semi-special design using standard stile and rail thicknesses and widths with panel arrangement and special mouldings in accordance with the detail drawings.

Note: See page 1. Also "Economy in the Design of Special Paneled Doors," page 16.

(3c) Doors shall be Special design in accordance with the detail drawings.

Note: See heading "Practical Suggestions and Economies," page 15.

(4) Materials and Construction

(4a) Glue—

(4a1) Glue shall be selected high grade vegetable glue.

(4a2) Glue for exterior doors shall be water-resisting.

(4a3) Glue for attaching cross-banding to lead sheet in X-Ray doors shall be special as used exclusively by HARDWOOD PRODUCTS CORPORATION.

(4b) Cores—

(4b1) Core blocks (and full length core strips) shall be of clear white pine with tongue and groove glue joint. Core finish on stile edges shall match the wood of face veneers.

(4b2) Cores shall be constructed in accordance with the New York State Building Code requiring alternate full length core strips.

(4b3) Cores for soundproof flush doors shall be tongued and grooved.

(4b4) Cores for X-Ray doors shall be of hardwood, not tongued and grooved.

(4c) Face Veneers—

Note: See pages 2, 10 and 11 and especially "Selecting and Specifying Face Veneers," page 15.

(4c1) Exterior paneled door stile and rail veneers shall be (rotary-cut) (sliced or sawed) thick of (specify wood). (Allow ..¢ per sq. ft. for veneer to be selected by the architect.)

(4c2) Flush door veneers shall be (rotary-cut) (sliced or sawed) thick of (specify wood). (Allow ..¢ per sq. ft. for veneer to be selected by the architect.)

(4c3) Interior paneled door stile and rail veneers shall be (rotary-cut) (sliced or sawed) thick of (specify wood). (Allow ..¢ per sq. ft. for veneer to be selected by the architect.)

(4c4) Panel veneers shall be (rotary-cut) (sliced or sawed) thick of (specify wood). (Allow ..¢ per sq. ft. for veneer to be selected by the architect.)

(4c5) Samples of all figured veneers shall be submitted for approval.

(4d) Flush Door Inlays—

(4d1) Flush door inlays shall be standard design No. .. of (Holly) (and) (Ebonized wood) (specify wood).

(4d2) Flush door inlays shall be of special design (in accordance with detail) of (specify wood). (Describe any special features not covered by detail.)

(4e) Panels—Panels shall be thick ply.

Note: See "Construction Standards," page 10.

(4f) Stile and Rail Joints—

Note: See "Doweled versus Mortised and Tenoned Construction," page 15.

(4f1) Doweled Construction—Stiles and rails shall be doweled together with oak or birch dowels not less than ½ in. in diameter and 5 in. long driven into close fitting dowel holes accurately spaced not to exceed 2¼ in. O. C. Dowels shall be grooved lengthwise (4 grooves to the dowel)

to facilitate complete glue contact.

(4f2) Mortise and Tenon Construction—Stiles and rails shall be mortised and tenoned together.

(4f3) Mortise and Tenon and Wedge Construction—Stiles and rails shall be mortised and tenoned and wedged together.

(4g) Splines—Furnish (pine) (hardwood) panel moulding splines. All mouldings shall be secured to splines and stiles and rails only—panels shall be loose.

Note: See "Economy in the Design of Special Paneled Doors," page 16.

(4h) Kiln Drying and Seasoning—All core and veneer stock shall be thoroughly kiln dried before fabrication. In addition all stiles and rails and all panels shall be kiln dried and seasoned to remove the excess moisture contained in the glue before assembling.

Note: See "Construction Standards," pages 2, 10 and 11.

(4i) Sanding—

Note: See "Construction Standards," pages 2, 10 and 11.

(4i1) All doors shall be machine sanded.

(4i2) All doors shall be (belt) (hand) sanded.

(5) Mill Fitting

Note: Much expensive field labor can be saved if doors are machine trimmed to accurate net size. Swing or hands of doors must be furnished if lock side bevels are to be mill executed, together with templates of hardware. Give also the net clearance required from finished floor to bottom of door.

(5a) The door manufacturer shall accurately mill fit to net dimensions all doors in accordance with the schedules to be furnished by (the architect) (specify).

(5b) This shall include accurate mortising for butts and locks to fit templates furnished by (the architect) (specify).

(5c) Protect all edges of mill fitted doors with wood strips tacked on to prevent damage in shipment, delivery and handling.

For condensed specifications see Page 2 for Paneled Doors and Page 10 for Flush Doors.



Century Apartment, New York—Chanin Construction Co., Builders—
6000 Hardwood Products Corp. Doors
Majestic Apartment, New York (Same Builders), 4500 Doors

CARE OF VENEERED DOORS

Shipment and Inspection

A large percentage of our doors are shipped "In the White," without the first coat of filler or stain. The care which is taken in packing for shipment will protect them against damp atmospheric conditions. If doors are wet in transit through carelessness on the part of the railroad companies or as a result of leaky car roofs, the face veneers may blister and loosen. We, of course, cannot be held responsible for damage while in the hands of the transportation company, and for this reason it is important that all shipments from our factory be carefully inspected upon arrival at destination. If the doors have been damaged in transit by water or rough handling, the railway agent should be notified at once to inspect them, and to acknowledge damage with a notation on the expense bill, so that the claim may be collected from the railway company without undue delay. This should be done before the doors are removed from the car or station.

Storing and Finishing

When doors are received they should be stored in a dry building. Before the doors are taken to a newly constructed building, the plaster should be thoroughly dried out, using artificial heat if necessary, and the building entirely enclosed. We will not be responsible if our doors are stored or hung in a freshly plastered building. Unless the doors are to be stored in a dry warehouse, it is important that they be given a coat of filler, stain and shellac as soon as possible after unpacking. After they are finally fitted and hung they should, without fail, be given a coat of paint on the top and bottom edges. This will close the pores and prevent moisture entering. Much will depend upon the character of the work done by the painter as to whether or not doors will present an attractive appearance. No matter how beautiful the grain of the wood its appearance will be spoiled by poor finishing and we strongly advise against trying to economize by employing cheap labor and material in finishing your doors.

RECENT HARDWOOD PRODUCTS CORPORATION DOOR INSTALLATIONS

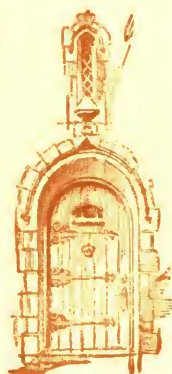
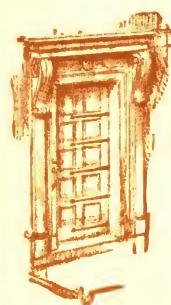
Buildings

Waldorf-Astoria Hotel, New York, N. Y.
Pierre Hotel, New York, N. Y.
Majestic Apartments, New York, N. Y.
Century Apartments, New York, N. Y.
Victoria Hotel and Addition, New York, N. Y.
New Weston Hotel, New York, N. Y.
No. 1 University Place, New York, N. Y.
Downtown Athletic Club, New York, N. Y.
New York Athletic Club, New York, N. Y.
Madison Hospital, New York, N. Y.
Apartment at 730 Park Avenue, New York, N. Y.
Salvation Army Territorial Headquarters, New York, N. Y.
Syracuse Psychiatric Institute & Hospital, Syracuse, N. Y.
LaFollette Park Auditorium, Chicago, Ill.
Passavant Hospital, Chicago, Ill.
Holy Name Cathedral Rectory, Chicago, Ill.
Austin Senior High School, Chicago, Ill.
Von Steuben High School, Chicago, Ill.
Powhatan Building, Chicago, Ill.
Jefferson Park Congregational Church, Chicago, Ill.
Speedway Hospital (Edw. Hines Memorial), Chicago, Ill.
Health Center Building, Lake Bluff, Ill.
Giannini Hall, Berkeley, Cal.
Berkeley Infirmary, Berkeley, Cal.
Wm. Taylor Hotel, San Francisco, Cal.
Presbyterian Hospital, Denver, Colo.
Civil Court Building, St. Louis, Mo.
Park Royal Apartments, St. Louis, Mo.
President Apartment, St. Louis, Mo.
Boody Building, Toledo, Ohio
First National Bank, East St. Louis, Ill.
Hawthorne Apartments, St. Louis, Mo.
St. Anthony's Hospital Addition, St. Louis, Mo.
Montgomery Ward Memorial, Chicago, Ill.
United Masonic Temple, Chicago, Ill.
St. Mary's Hospital, East St. Louis, Ill.

Architects

Schultze & Weaver, New York, N. Y.
Schultze & Weaver, New York, N. Y.
Irwin S. Chanin, New York, N. Y.
Irwin S. Chanin, New York, N. Y.
Schwartz & Gross, New York, N. Y.
Robert T. Lyons, New York, N. Y.
Emery Roth, New York, N. Y.
Starrett & Van Vleck, New York, N. Y.
York & Sawyer, New York, N. Y.
Arthur Loomis Harmon (Shreve-Lamb & Harmon), New York,
Lafayette A. Goldstone, New York, N. Y.
Voorhees, Gmelin & Walker, New York, N. Y.
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Michaelsen & Rognstad, Chicago, Ill.
Holabird & Root, Chicago, Ill.
Jos. W. McCarthy, Chicago, Ill.
John Christiansen, Chicago, Ill.
Paul Gerhardt, Jr., Chicago, Ill.
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Michaelsen & Rognstad, Chicago, Ill.
U. S. Veterans Bureau
Edw. Schiewe, Chicago, Ill.
Wm. C. Hays, San Francisco, Cal.
Arthur Brown, Jr., San Francisco, Cal.
Louis P. Hobart, San Francisco, Cal.
W. E. & A. A. Fisher, Denver, Colo.
Klipstein & Rathmann, St. Louis, Mo.
David R. Harrison, St. Louis, Mo.
David R. Harrison, St. Louis, Mo.
Mills, Rhines, Bellman & Nordhoff, Toledo, Ohio
Russell & Crowell, St. Louis, Mo.
Pleitsch & Price, Inc., St. Louis, Mo.
Klutho, Ranft & Klutho, St. Louis, Mo.
James Gamble Rogers, New York, N. Y.
C. W. & Geo. L. Rapp, Chicago, Ill.
Frank Kratzer, St. Louis, Mo.

MANUAL OF VENEERED DOORS



**HARDWOOD
PRODUCTS
CORPORATION**

NEENAH
WISCONSIN